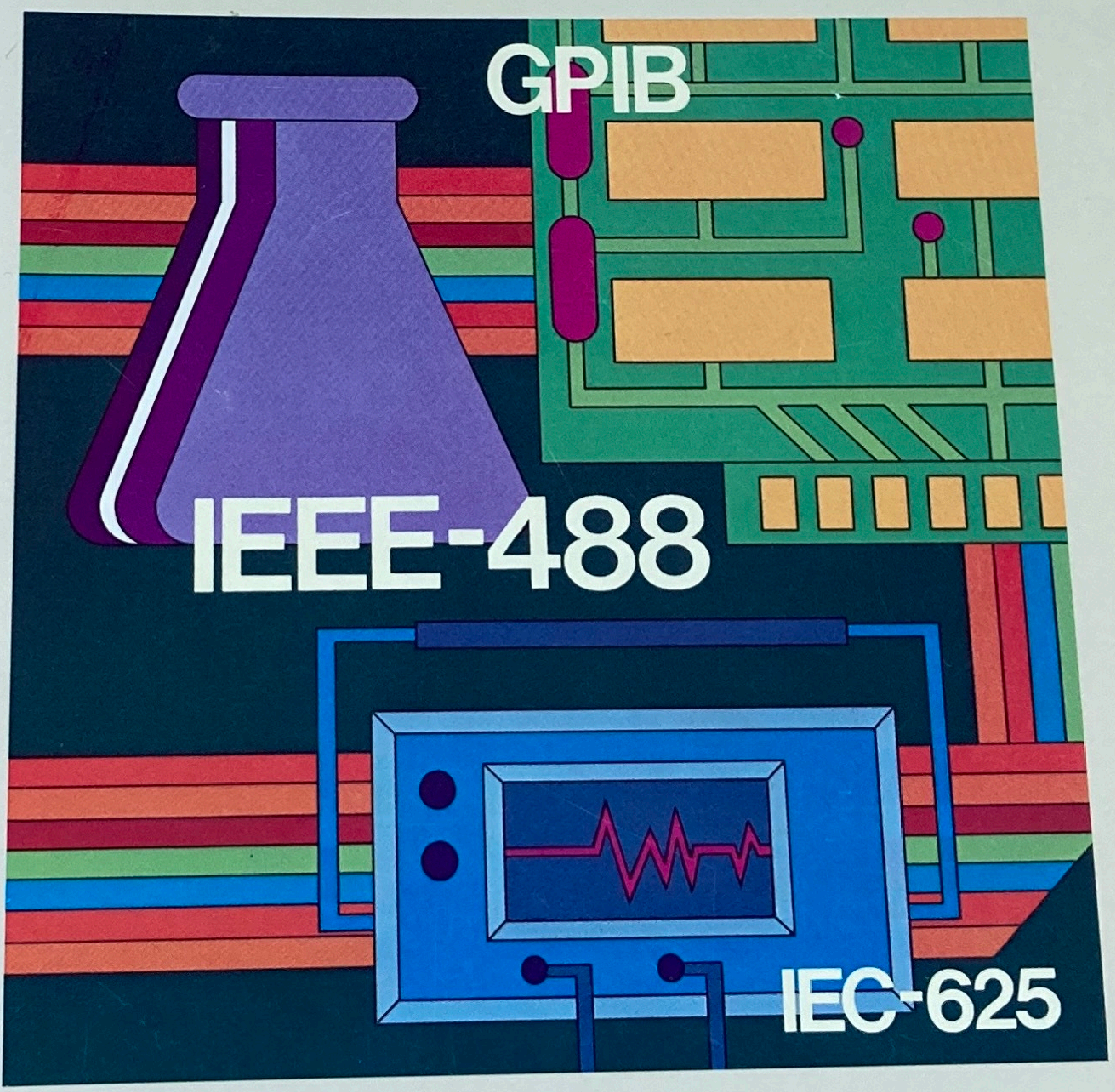
Apple II

IEEE-488 Interface

User's Guide



<data>, even if <data> already has a <LF> after each <CR>. The LINEFEED option does not affect the data sent by WRITECNT commands. During READ commands issued while LINEFEED is set to on, the IEEE-488 card expects a <LF> to follow the terminating <CR>.

The LINEFEED commands are as follows:

```
10   PRINT D$;"PR#3"  :REM  THE VALUE OF D$ IS <CTRL-D>
20   PRINT "LF1"  (line feed character is provided after each <CR>)

20   PRINT "LF0"  (line feed character is not provided after each <CR>)
```

LINEFEED is set to off when <EOS> is changed from <CR>.

EOS: ES

End Of String Character. The EOS command is used to change the character used to terminate a string. The EOS character is a <CR> under normal or default conditions. A reset or PR#3 instruction resets the EOS character to <CR> . LINEFEED is set to off when <EOS> is changed from <CR>. The EOS command is

```
     ES <EOS> <CR>
```

The EOS command format is as follows:

```
10   PRINT D$;"PR#3"  :REM  THE VALUE OF D$ IS <CTRL-D>
20   PRINT "ES!"
```

This command changes the EOS character from <CR> to !.

SCREEN: SC

Screen Control. The SCREEN command is used to control the CRT display during operation of the GPIB. The CRT display shows all input and output characters when SCREEN control is on. The display is very useful during program debugging. The normal (default) condition of SCREEN is off. The SCREEN command takes the form

```
     SC <off = 0/on = 1> <CR>
```

The SCREEN command is as follows:

```
10   PRINT D$;"PR#3"  :REM  THE VALUE OF D$ IS <CTRL-D>
20   PRINT "SC1"    (data is displayed on the CRT display)

20   PRINT "SC0"    (data is not displayed on the CRT)
```

DEVICE: DV

Controller Device Number. The DEVICE command is used to set the device number of the Apple controller. The normal or default device number of the Apple controller is 0, and it will be reset to 0 by a PR#n instruction, or by pressing RESET. The device number, used modulo 32, may be one or two ASCII decimal digits; if the number is 09 or less, the leading 0 can be omitted. The device number 31 (corresponding to 31,63,95...) may not be used because it is reserved for the UNLISTEN and UNTALK commands. The DEVICE command takes the form

```
     DV <device number> <CR>
```

The DEVICE command follows:

```
10   PRINT D$;"PR#3"  :REM  THE VALUE OF D$ IS <CTRL-D>
20   PRINT "DV01"
```

WRITE: WT

Write Data Out. The WRITE command sends data to all devices named in <listen list>. The WRITE command is the normal way of sending data from the Apple to one or more remote devices. The command takes the form

```
     WT <listen list> <data> <EOS>
```

An EOI (End-Or-Identify) bus signal is automatically sent with the last <EOS> character. A <CR> is the normal <EOS>. If the LF flag is set (see the LF command), and the <EOS> character is <CR>, then EOI is sent with the <LF>. Sample WRITE commands follow:

```
10   D$;"PR#3": REM  THE VALUE OF D$ IS <CTRL-D>
30   PRINT "WT1"; Z$; A$ : REM  THE VALUE OF Z$ IS <CTRL-Z>
```

This command sends the string of data, A$, to the listener with address equal to the value of keyboard character 1 (49 decimal, 61 octal or 31 hex).

```
40   PRINT "WT8"; CHR$(97); Z$; A$ : REM  THE VALUE OF Z$ IS <CTRL-Z>
```

This command sends the string of data, A$, to the listener with primary address "8" and secondary address "a". The CHR$ function must be used to send lower-case characters such as "a" from the Apple keyboard. The CHR$ functions are listed in table A-3 of Appendix A. The ASCII code for "a" is 97, so CHR$(97) generates an "a".

Program 1 in Appendix D shows how lower case characters can be sent from Integer BASIC.

APPLE GPIB COMMAND SUMMARY

COMMAND	FORMAT	BASIC	BUS?	PAGE
WRITE	WT <listen list> <data> <EOS>	PRINT	YES	29
WRITECNT	WC <listen list> <count> <data>	PRINT	YES	30
READ	RD <talker> <CTRL-Z> <data> <term>	INPUT	YES	30
READCNT	RC <talker> <CTRL-Z> <count> <data> <term>	INPUT	YES	31
XFER	XF <talker> <CTRL-Z> <listen list> <CR>	PRINT	YES	32
TRIGR	TG <listen list> <CR>	PRINT	YES	32
CLRAL	CA <CR>	PRINT	YES	32
CLEAR	CL <listen list> <CR>	PRINT	YES	33
REMAL	RA <CR>	PRINT	YES	33
REMDV	RM <listen list> <CR>	PRINT	YES	33
LLKAL	LL <CR>	PRINT	YES	34
LOCAL	LA <CR>	PRINT	YES	34
LOCDV	LO <listen list> <CR>	PRINT	YES	34
SRQD	SR <srq> <CR>	INPUT	YES	35
SPOLL	SP <talker> <CTRL-Z> <status word> <CR>	INPUT	YES	35
PPOLL	PP <status word> <CR>	INPUT	YES	36
PPENB	PE <enable list> <CR>	PRINT	YES	36
PPDIS	PD <listen list> <CR>	PRINT	YES	37
PPUAL	PU <CR>	PRINT	YES	37
ABORT	AB <CR>	PRINT	YES	37
LINEFEED	LF <off/on> <CR>	PRINT	NO	27
EOS	ES <EOS> <CR>	PRINT	NO	28
SCREEN	SC <off/on> <CR>	PRINT	NO	28
DEVICE	DV <device number>	PRINT	NO	29
UNTALK	UT <CR>	PRINT	YES	37

APPLE GPIB COMMAND STRINGS

```
  <listen list>  ::=  <CTRL-Z> | <listener> <CTRL-Z> | <listener> <listen list>

  <listener>  ::=  <primary listener> | <primary listener> <secondary address>

* <primary listener>  ::=  <SP> | ! | " | # ... > | ?

* <secondary address>  ::=  ' | a | b | c ... } | ~

  <count>  ::= <decimal digit> <CTRL-Z> | <decimal digit> <count>
               NOTE: The maximum total value for count is 255.

  <EOS>  ::=  any ASCII character

  <data>  ::=  empty | any ASCII character | any ASCII character <data>

  <talker> ::= empty | <primary talker> | <primary talker> <secondary address>

* <primary talker>  ::=  @ | A | B | C ... ^ | _

* <hex digit>  ::=  0 | 1 | 2 ... 9 | A | B ... F

* <decimal digit>  ::=  0 | 1 | 2 ... 9

  <status word>  ::=  <hex digit> <hex digit>

  <srq>  ::=  ASCII "T" | ASCII "F"

  <term>  ::= empty | <CR> | <EOS> | EOI
              NOTE: empty if last char = <CR> or <CR><LF>

  <device number>  ::=  <decimal digit> <decimal digit>
                        NOTE: Maximum device number is 30

  <off/on>  ::=  ASCII "0" | ASCII "1"

  <enable list>  ::= <listener> <enable> | <listener> <enable> <enable list>

* <enable>  ::=  @ | A | B ... N | O

  <CR>  ::=  ASCII carriage return   (13 decimal)

  <LF>  ::=  ASCII linefeed          (10 decimal)

  <SP>  ::=  ASCII space             (32 decimal)

  <CTRL-Z>  ::=  ASCII SUB           (26 decimal)

  <CTRL-D>  ::=  ASCII ET            (4  decimal)

                 * NOTE: Marked elements are ASCII characters.
```

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PLEASE READ THIS MANUAL BEFORE ATTEMPTING TO INSTALL THE APPLE II IEEE-488 INTERFACE CARD IN THE APPLE COMPUTER. INCORRECT INSTALLATION COULD CAUSE PERMANENT DAMAGE TO BOTH THE INTERFACE CARD AND TO THE APPLE.

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